

The Pennsylvania State University
The Graduate School
College of Health and Human Development

**ACCURACY OF ATHLETIC TRAINING STUDENT PERFORMANCE FACTORS
FOR DETERMINING BOC EXAM FIRST-TIME PASS OUTCOMES**

A Thesis in
Kinesiology
by
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ABSTRACT

Athletic training (AT) programs are required to maintain a three-year aggregate first-time pass rate of 70% on the Board of Certification (BOC) exam. Currently, there are no uniform entrance-to-major criteria for AT programs to employ when attempting to identify students poised for such success. Various academic variables have been previously identified as single and combined predictors of first-time success; however, these investigations reflect prior versions of the credentialing examination based on what are now obsolete editions of the professional practice analysis. Therefore, the purpose of this study was to determine the accuracy of AT student performance factors as indicators of successfully passing the current version of the BOC exam on a first attempt. An additional aim was to determine the utility of a unique composite score that may serve as a potential all-inclusive metric leading to establishing admission criteria for AT programs. Per pilot data, we hypothesized that cumulative grade point average (GPA) upon admission to an AT program would be the most accurate secondary admissions criterion, as determined by receiver operating characteristic curve analysis. Additionally, we sought to identify the threshold indicative of success for each variable of interest using the index of union method. Cumulative GPA upon graduation provided fair accuracy in predicting first-time success on the BOC exam; however, SAT outcomes provided excellent accuracy. Although not the most accurate of all variables, the unique composite score may represent an all-inclusive indicator of success. Program administrators and AT educators may use these outcomes to shape their related programmatic operations.

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LIST OF ABBREVIATIONS

Page numbers reflect the first appearance of each abbreviation:

- CAATE: Commission on Accreditation of Athletic Training Education.....	1
- AT: Athletic training.....	1
- BOC: Board of Certification.....	1
- GPA: Grade point average.....	1
- ROC: Receiver operating characteristic.....	3
- AUC: Area under the ROC curve.....	3
- IU: Index of Union.....	5
- PANCE: Physician Assistant National Certifying Exam.....	7
- PA: Physician assistant.....	10
- PT: Physical therapy.....	10
- GRE: Graduate Record Examination.....	10
- NPTE: National Physical Therapy Examination.....	10

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First and foremost, I must thank Jesus Christ, my Lord and Savior, for blessing me beyond measure and opening the door for me to attend Penn State. I would not be where I am today without His incredible love and mercy on my life, for which I am eternally grateful.

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DEDICATION

This thesis is dedicated to my father and grandfather, Jeffry and Herb Hobson, who gave me my love for Penn State. More importantly, these men have given me a love for the Lord that has shaped me into the man I am today. My father and grandfather have been excellent examples of how to love God and love others, and I am thankful for how they have challenged and encouraged me to pursue His will for my life. I humbly dedicate this thesis to two of the men who have given much of what I am thankful for today and into eternity.

Chapter 1

INTRODUCTION

In 2013, the Commission on Accreditation of Athletic Training Education (CAATE) implemented Standard 11, which requires athletic training (AT) programs to maintain a three-year aggregate first-time pass rate of 70% on the Board of Certification (BOC) exam as a measure of curricular effectiveness.¹ Between 2015 and 2017, approximately 20% of bachelor's degree programs and 4% of entry-level master's degree programs were identified as non-compliant with this standard.² Athletic training programs that fail to meet this accreditation standard are placed on probation until they provide sufficient evidence that demonstrates progress in addressing, and correcting this deficiency.^{1,2} While this contemporary standard aims to promote a diligent admissions process, there are no uniform entrance-to-major criteria for AT programs^{3,4} as well as a lack of current evidence to help guide faculty, and administrators in employing a valid related mechanism.

Independent academic variables, such as cumulative grade point average (GPA)^{5,6}, AT-specific course GPA⁶, and academic minor GPA⁶, have been identified as single predictors of first-time BOC exam success; furthermore, Harrelson et al.⁶ found that a combination of these variables, in addition to ACT composite score and number of semesters enrolled in an academic program, significantly predicted first-time success. Contrastingly, while educators perceive time spent in clinical experiences as contributing to BOC exam success, these data have been suggested to be statistically insignificant predictors.^{5,7,8} Although conflicting reports exist, this may be the function of studies being insufficiently powered, mainly due to a lack of sample size calculation.⁵⁻⁸

Although insightful, the inclusive outcomes from prior investigations reflect preceding iterations of the credentialing examination based on what are now obsolete editions of the professional practice analysis; thus, their impact for shaping present curricular models, policy, and practice may be inadequate. Therefore, the purpose of this study was to determine the accuracy of AT student performance factors as indicators of successfully passing the current version of the BOC exam on a first attempt. Per pilot data, we hypothesized that cumulative GPA upon admission to an AT program would be the most accurate secondary admissions criterion. As a means to assist athletic training faculty and higher education administrators in developing sound admission criteria, we also sought to determine the related thresholds indicative of success. Furthermore, we sought to define the accuracy of a unique composite score as an inclusive secondary admissions criterion for determining success in passing the BOC exam on a first attempt.

Chapter 2

METHODS AND MATERIALS

Experimental Design and Participants

A retrospective cohort study experimental design was conducted at The Pennsylvania State University. The university's Office for Research Protections determined that this study did not meet the definition of human subject research, and therefore did not require further review or approval by the Institutional Review Board (Appendix B).

A power calculation was performed to determine the sample size needed to assess the accuracy of AT student factors as indicators of first-time success on the BOC exam. Per receiver operating characteristic (ROC) curve analysis, using the following parameters: single test method; significance level (α) of 0.05; power ($1-\beta$) of 80%; area under the ROC curve (AUC) of 0.70; and allocation ratio of one, a minimum of 24 students were required to make such determinations.⁹

Data Collection

Secondary program admissions data were collected from 26 students that recently graduated from the AT major at The Pennsylvania State University. An administrative support assistant de-identified data prior to submitting it to the investigators for analysis. These data included cumulative GPA upon program admission, pre-professional phase course GPA, averaged admission interview scores, averaged preceptor evaluation of applicant scores, the unique composite score, and BOC exam outcomes. Students who were missing multiple data points for the variables of interest were excluded from the study. Descriptive statistics for the secondary program admissions variables are provided in Table 1.

Table 1. Descriptive Statistics for Secondary Program Admissions Variables

Variable	Mean \pm SD	Median	Range (min, max diff)
Cum GPA	3.25 \pm 0.29	3.21	(2.61, 3.85 1.24)
PPP GPA	3.63 \pm 0.21	3.63	(3.18, 4.00 0.82)
Interview Score	8.41 \pm 0.72	8.42	(6.42, 9.58 3.16)
Preceptor Evaluation	94.00% \pm 2.81%	94.00%	(90.00%, 100.00% 10.00%)
Unique Composite Score	7.84 \pm 0.81	7.65	(6.45, 9.58 3.13)

Cum GPA = Cumulative GPA upon program admission; PPP GPA = Pre-professional phase GPA; Interview Score = Averaged admission interview score; Preceptor Evaluation = Averaged preceptor evaluation of applicant score; SD = Standard deviation; diff = Difference between max and min values of the range

Grade point averages were calculated on a four-point scale, interviews were scored out of ten points, averaged preceptor evaluation of applicant scores were out of one-hundred percent, and BOC exam outcomes were tallied on a pass or fail basis. The unique composite score ranged from zero to ten and was comprised of weighted factors. Table 2 outlines the composite score's composition.

Table 2. Point Values and Associated Weights Assigned to Components of the Unique Composite Score

Point Value	Cum GPA (30%)	PPP GPA (40%)	Preceptor Eval (20%)	Interview Score (10%)
10	3.90 – 4.00	3.90 – 4.00	94% – 100%	10-point rubric averaged across three interview panel members
9	3.70 – 3.89	3.70 – 3.89	90% – 93.9%	
8	3.50 – 3.69	3.50 – 3.69	87% – 89.9%	
7	3.30 – 3.49	3.30 – 3.49	83% – 86.9%	
6	3.10 – 3.29	3.10 – 3.29	80% – 82.9%	
5	3.00 – 3.09	3.00 – 3.09	76% – 79.9%	
4	2.80 – 2.99	–	70% – 75.9%	
3	2.60 – 2.79	–	65% – 69.6%	
2	2.50 – 2.59	–	–	
0	0.00 – 2.49	0.00 – 2.99	0% – 64.9%	

Cum GPA = Cumulative GPA upon program admission; PPP GPA = Pre-professional phase course GPA; Preceptor Eval = Averaged preceptor evaluation of applicant score; Interview Score = Averaged admission interview score

Statistical Analyses

We utilized IBM® SPSS Statistics (IBM Corporation, Armonk, NY) software to perform ROC curve analysis for each variable. The accuracy of each factor was determined by the AUC, and further interpreted according to Carter et al.¹⁰ as provided in Table 3.

Table 3. Values for Interpreting the AUC from Carter et al.¹⁰

	Perfect	Excellent	Good	Fair	Poor	No Value
AUC =	1.00	0.90 – 0.99	0.80 – 0.89	0.70 – 0.79	0.51 – 0.69	≤ 0.50

Using the ROC curve data, optimal thresholds for passing the BOC exam on a first attempt were computed for each variable by the index of union (*IU*) method. The *IU* method identifies an optimal threshold from the ROC curve that possesses values for both sensitivity and specificity that are close to that of the AUC while minimizing the difference between sensitivity and specificity.¹¹ Additionally, positive and negative likelihood ratios were computed from the sensitivity and specificity of each variable of interest to aid in interpreting outcomes. We interpreted likelihood ratios according to Jaeschke et al.¹² as described in Table 4.

Table 4. Practical Values of Likelihood Ratios adapted from Jaeschke et al.¹²

Positive Likelihood Ratio	Negative Likelihood Ratio	Shift in Probability for First-time BOC Exam Outcome
> 10	< 0.1	Large, often conclusive
5 – 10	0.1 – 0.2	Moderate but usually important
2 – 5	0.2 – 0.5	Small, sometimes important
1 – 2	0.5 – 1.0	Very small, usually unimportant

Chapter 3

RESULTS

Cumulative GPA upon program admission, and pre-professional phase GPA provided fair accuracy in predicting first-time BOC exam outcomes. Cumulative GPA upon admission had a higher sensitivity, suggesting it is better suited to identify students who will fail the BOC exam on their first attempt; furthermore, related likelihood ratios suggest a cumulative GPA of 3.08 upon admission yields a small shift in the probability of either passing or failing. Pre-professional phase GPA had a higher specificity, suggesting it is better suited to identify students who will pass the BOC exam on their first attempt; moreover, associated likelihood ratios suggest a pre-professional phase GPA of 3.58 yields a very small shift in the probability of either passing or failing. The averaged admission interview score and preceptor evaluation of applicant score were found to be inaccurate, and thus impractical variables to use for projecting first-time success or failure for passing the BOC exam.

The unique composite score bordered on fair accuracy. This ensemble metric had a higher sensitivity, suggesting it is better suited to identify students who will fail the BOC exam on their first attempt; furthermore, related likelihood ratios suggest a composite score of 7.41 yields a small shift in the probability of either passing or failing.

The ensemble outcomes of the ROC curve analysis are found in Table 5.

Table 5. Ensemble Outcomes of ROC Curve Analysis for Secondary Admissions Criteria

Variable	AUC	Threshold	Sensitivity	1-Specificity	+LR	-LR
Cum GPA	0.70	3.08	0.70	0.33	2.09	0.46
PPP GPA	0.71	3.58	0.57	0.33	1.70	0.65
Interview Score	0.33	8.46	0.44	0.67	0.65	1.70
Preceptor Evaluation	0.47	93%	0.65	0.67	0.98	1.05
Unique Composite Score	0.69	7.41	0.70	0.33	2.09	0.46

Cum GPA = Cumulative GPA upon admission; PPP GPA = Pre-professional phase GPA; Interview Score = Averaged admission interview score; Preceptor Evaluation = Averaged preceptor evaluation of applicant score; +LR = Positive likelihood ratio; -LR = Negative likelihood ratio

Chapter 4

DISCUSSION

Secondary Admissions Criteria

Pre-professional phase course GPA was a marginally more accurate secondary admissions criterion for gauging first-time success on the BOC exam than the hypothesized cumulative GPA upon program admission, which may be the product of our pilot data being potentially underpowered. However, our results complement those of Ennulat et al.¹³ who found that prerequisite course GPA was a greater estimator of success on the Physician Assistant National Certifying Exam (PANCE) than cumulative GPA. Exposure to professional competencies, and thus credentialing exam content, provided in the pre-professional (or prerequisite) courses, and absent from general education courses may lead to this finding. Contrastingly, the averaged admissions interview score, and preceptor evaluation of applicant score were found to be inaccurate indicators of first-time success on the BOC exam. Similarly, Higgins et al.¹⁴ found interview scores to be a predictor of PANCE success for only 2 of the 6 programs included in their study. Therefore, program personnel may consider prioritizing student performance in prerequisite courses followed by general education courses with regard to AT admission decisions to help ensure first-time success on the BOC exam, and compliance with Standard 11. Subsequently, our findings suggest scored interviews, and appraisals require thoughtful consideration for their utility in the admissions process, apart from BOC exam outcomes, given the time burden associated with capturing these variables. For instance, interviews, and appraisals may be of other benefit, such as evaluating intangible skills, though programs must delineate their intended function. This is especially applicable given that communication skills,

trustworthiness, dependability, and commitment to the field have been identified as characteristic markers of quality athletic trainers.^{15,16}

Unique Composite Score

This ensemble metric was developed to provide program administrators with an all-inclusive indicator of BOC exam success. Various programs incorporate such a metric in their admissions process. Prior evidence suggests that a composite set of variables including overall academic GPA, AT-specific GPA, academic minor GPA, ACT composite score, and number of semesters predict first-time exam success.⁶ However, this was established for a previous iteration of the credentialing exam and only accounted for 42% of the variance in predicting first-time BOC exam success. We found our unique composite score to be 69% accurate. Although our ensemble metric was 27% more accurate than that of Harrelson et al.⁶, it bordered on being fair. This may be due to the inaccuracies of the interview, and preceptor evaluation in determining this outcome. Comparatively, the differences among cumulative GPA, pre-professional phase GPA, and the unique composite score were within 1-to-2 percent. Despite not predicting success on the BOC exam, these factors appear to assess intangibles significant to AT professionals, suggesting that the unique composite score can be utilized to comprehensively gauge the professional and academic preparedness of students. The findings of this study suggest that academic components should be the emphasis of an ensemble metric, as the accuracy of the unique composite score was attributed to the GPA outcomes. The results of prior pilot analysis determined the weights we applied to each component of the unique composite score; however, our most recent assessment suggests weighting of components should be reconsidered, and rescaled accordingly. Future research should be conducted to determine weighting of such variables.

Post-Hoc Analysis of Additional Academic Variables

We conducted a post-hoc analysis for academic variables that have been previously investigated as indicators of first-time BOC exam success. This analysis was conducted in order to account for the current version of the BOC exam, and to provide additional variables for programs to consider when devising admission processes. These additional factors included cumulative GPA upon graduation, combined math and reading SAT scores, and clinical education hours.

Descriptive statistics for the additional academic variables are provided in Table 6.

Table 6. Descriptive Statistics for Additional Academic Variables

Variable	Mean \pm SD	Median	Range (min, max diff)
Final GPA	3.25 \pm 0.26	3.26	(2.66, 3.74 1.08)
SAT	1072 \pm 133	1080	(812, 1300 488)
Clinical Education Hours	1164.80 \pm 215.52	1142.55	(848.42, 1649.00 800.58)

Final GPA = Cumulative GPA upon graduation; SAT = Combined math and reading SAT score;
Clinical Education Hours = Clinical hours spent within the program; SD = Standard deviation;
diff = Difference between max and min values of the range

Cumulative GPA upon graduation provided fair accuracy. Cumulative GPA had a higher sensitivity, suggesting that it is better suited to identify students who will fail the BOC exam on their first attempt; moreover, associated likelihood ratios suggest a cumulative GPA of 3.12 upon graduation yields a small shift in the probability of either passing or failing. The combined math and reading SAT score provided excellent accuracy. This variable also had a higher sensitivity, suggesting that it is better suited to identify students who will fail the BOC exam on their first attempt; furthermore, related likelihood ratios suggest a combined math and reading SAT score of 895 yields a small shift in the probability of passing and a large shift in failing. Lastly, clinical education hours provided poor accuracy. Clinical education hours had a higher sensitivity, suggesting it is better suited to identify students who will fail the BOC exam on their first attempt; furthermore, related likelihood ratios suggest a total of approximately 1072 hours yields

a small shift in the probability of either passing or failing. The ensemble outcomes of the ROC curve analysis for the additional academic variables are found in Table 7.

Table 7. Ensemble Outcomes of ROC Curve Analysis for Additional Academic Variables

Variable	AUC	Threshold	Sensitivity	1-Specificity	+LR	-LR
Final GPA	0.77	3.12	0.74	0.33	2.22	0.39
SAT	0.99	895	0.96	0.33	2.87	0.06
Clinical Education Hours	0.68	1072.44	0.70	0.33	2.09	0.46

Final GPA = Cumulative GPA upon graduation; SAT = Combined math and reading SAT score;
Clinical Education Hours = Clinical hours spent within the program

Our findings suggest that SAT outcomes may provide an early indication of student acuity, as the combined math and reading SAT score delivered the greatest accuracy of all examined variables. Although they vary in content, both the SAT and BOC are standardized exams, potentially lending to this excellent accuracy. Prior investigations in the sister disciplines of physician assistant (PA) and physical therapy (PT) have utilized the standardized Graduate Record Examination (GRE) to predict success on their respective credentialing exams. The outcomes of the GRE have proven to be a reliable predictor of success on both the PANCE¹⁴ and National Physical Therapy Exam (NPTE)^{17,18}. Therefore, AT programs at the undergraduate level may consider incorporating SAT outcomes in their admission decisions, while programs that already have or intend to transition to the entry-level master's may utilize GRE outcomes.

Although cumulative GPA upon graduation did not provide the greatest accuracy, it has been cited as a common measure utilized to gauge student quality.¹⁹ Prior investigations have revealed cumulative undergraduate GPA as contributing to and indicating success on the PANCE^{13,14} and NPTE^{17,18,20}, as well as the BOC exam²¹, reflecting its utility in graduate health care programs. Utzman et al.¹⁸ identified an undergraduate GPA of 3.49 as an optimal threshold indicative of NPTE success. Furthermore, Bruce et al.²¹ identified an undergraduate GPA of 3.18 as an optimal threshold indicating success in an AT master's program. Although their study did

not identify an undergraduate GPA threshold specific to first-time BOC exam success, the 3.12 threshold identified in our study provided fair accuracy. Thus, our results suggest that graduate-level AT programs may consider elevating the minimum GPA to be above the common industry-standard of a 3.0.^{19,22}

Limitations

Some limitations existed for this study. Primarily, the data were collected from a single cohort at The Pennsylvania State University and retrospectively analyzed. This institutional bias may prevent our findings from being generalized to programs nationwide. Variance of AT program and degree requirements across universities may also limit generalization.

The admission interview panel and preceptors providing evaluations in our program were inconsistent; therefore, the levels of expertise and years of experience evaluating students may have varied. While this limits internal validity, it may in fact bolster external validity.

Additionally, the clinical experiences of the pre-professional phase are observational in nature, meaning preceptors can only speculate the success of the applicant as an AT student. Although preceptors can gauge the students' interest and foundational knowledge, these evaluations do not reflect the application of knowledge, skills, and abilities that are acquired and demonstrated further along in the AT curriculum. Hence, program administrators and faculty should view the outcomes of these assessments as supplementing the academic success of a student prior to admission decisions.

An additional factor potentially influencing our results is the consistency of course instructor. Two of the four pre-professional courses are offered solely at the University Park Campus, and routinely taught by the same instructors during the semester that immediately

precedes admission to the AT program, which provides consistency in course content, and delivery for each incoming cohort. Contrastingly, general education courses can drastically vary with regard to campus offering, course instructor, and the semester in which the student takes such courses. Therefore, course consistency, as well as content, may be factors leading to the slightly greater accuracy we observed for the pre-professional phase course GPA.

Lastly, the outcomes of this study are primarily focused on bachelor-degree programs; thus, the comparisons drawn to PA and PT programs require careful consideration. However, the results of this study may lend insights to AT programs as they continue to transition to the entry-level master's degree.

Conclusions

Pre-professional phase GPA was the most accurate secondary admission criterion indicative of successfully passing the BOC exam on a first attempt. Furthermore, the combined math and reading SAT score was the most accurate of all examined variables, which may be due to the standardized nature of the exam. The unique composite score may represent an all-inclusive indicator of success. A minimum pre-professional phase GPA of 3.58, combined math and reading SAT score of 895, and unique composite score of 7.41 are better suited to identify those students who will fail the BOC exam on their first attempt. The outcomes of this study may be used by educators to shape their related programmatic operations. Further investigation should focus on identifying the best student performance factors indicative of successful BOC exam outcomes.

APPENDIX A

Thesis Proposal

Purpose

In 2013, the Commission on Accreditation of Athletic Training Education (CAATE) implemented Standard 11, which requires athletic training (AT) programs to maintain a three-year aggregate first-time pass rate of 70% on the Board of Certification (BOC) exam as a measure of curricular effectiveness.¹ Between 2015 to 2017, approximately 20% of bachelor's degree programs were identified as non-compliant with this standard.² Athletic training programs that fail to meet this accreditation standard are placed on probation until they provide sufficient evidence that demonstrates progress in addressing, and correcting this deficiency.^{1,2} While this contemporary standard aims to promote a diligent admissions process, there are no uniform entrance-to-major criteria for AT programs^{3,4} as well as a lack of current evidence to help guide faculty, and administrators in employing a valid related mechanism.

Independent academic variables, such as cumulative grade point average (GPA)^{5,6}, AT-specific course GPA⁶, and academic minor GPA⁶, have been identified as single predictors of first-time success; furthermore, Harrelson et al.⁶ found that a combination of these variables, which comprised ACT composite score and number of semesters enrolled in an academic program, was a significant predictor of first-time success. Contrastingly, while educators perceive time spent in clinical experiences as contributing to first-time success, these data have been suggested to be statistically insignificant predictors.^{5,7,8} Although conflicting reports exist, this may be the function of studies being insufficiently powered, either due to a lack of sample size calculation or not meeting a targeted threshold.⁵⁻⁸

Although insightful, the inclusive outcomes from prior investigations reflect preceding iterations of the credentialing examination based on what are now obsolete editions of the professional practice analysis; thus, their impact for shaping present curricular models, policy, and practice may be inadequate. Therefore, the purpose of this study is to determine the accuracy of AT student performance factors as indicators of successfully passing the current version of the BOC exam on a first attempt, and the utility of a unique composite score that may serve as a potential metric leading to establishing admission criteria for AT programs.

Specific Aim 1: To assess the accuracy of AT student performance variables for successfully passing the BOC exam on a first attempt.

Hypothesis 1a: Cumulative GPA upon admission to an athletic training program would be the most accurate secondary admissions criterion.

Hypothesis 1b: Cumulative GPA upon graduation will be the most accurate of all variables.

Research Question 1: What is the threshold indicative of success for each variable of interest?

Specific Aim 2: Determine the utility of a unique composite score devised to help guide the admissions process.

Research Question 2: Is a composite score comprised of weighted factors, which represent cumulative GPA, pre-professional phase GPA, interview, and preceptor evaluations, an accurate inclusive secondary admissions criterion for determining successfully passing the BOC exam on a first attempt.

Plan

This study is a cohort experimental design. The sequential procedures are as follows:

1. Secondary admissions data, cumulative GPA upon graduation, and BOC exam outcomes will be compiled.
 - a. Secondary admissions data includes cumulative GPA upon admission, pre-professional phase course GPA, averaged admission interview scores, averaged preceptor evaluation of applicant scores, and the unique composite score.
 - b. College entrance exam scores, and clinical hours spent while in the program will be evaluated as variables

Data Analysis

Using IBM SPSS Statistics 25, receiver operating characteristic (ROC) curve analysis will be conducted for each variable under the following parameters: Single test method; significance level (α) of 0.05; power ($1-\beta$) of 80%; area under the ROC curve (AUC) of 0.700; allocation ratio of 1. Accuracy of variables will be determined via the AUC. Additionally, the index of union (IU) method will be employed to determine an optimal threshold value for each variable.

Outcomes

The results of this study may be used to assist athletic training faculty, and higher education administrators in developing sound admissions, and related curricular practices based on empirical evidence to ensure program compliance with associated accreditation standards.

APPENDIX B

IRB Letter



Office for Research Protections
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NOT HUMAN RESEARCH

Date: January 22, 2019

From: Philip Frum, IRB Analyst

To: [Zachary Hobson](#)

Type of Submission:	Initial Study
Title of Study:	Accuracy of Athletic Training Student Performance Factors for Determining BOC Exam First-Time Pass Outcomes
Principal Investigator:	Zachary Hobson
Study ID:	STUDY00011489
Submission ID:	STUDY00011489
Funding:	Not Applicable

The Office for Research Protections determined that the proposed activity, as described in the above-referenced submission, does not meet the definition of human subject research as defined in 45 CFR 46.102(d) and/or (f). Institutional Review Board (IRB) review and approval is not required.

The IRB requires notification and review if there are any proposed changes to the activities described in the IRB submission that may affect this determination. If changes are being considered and there are questions about whether IRB review is needed, please contact the Office for Research Protections.

This correspondence should be maintained with your records.

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